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(71) Applicant: ENTRICOM, INC. [US/US]; Suite 900, 720 Olive Way, Seattle, WA 98101 (US).

(72) Inventors: PETERSON, Bruce, J.; 16797 NE 35th, Bellevue, WA 98008 (US). LAVAR, D., Edwards; 20229 37th Avenue West, Lynnwood, WA 98036 (US).

(74) Agent: LOWE, David, A.; Black Lowe & Graham, 816 Second Avenue, Seattle, WA 98104 (US).

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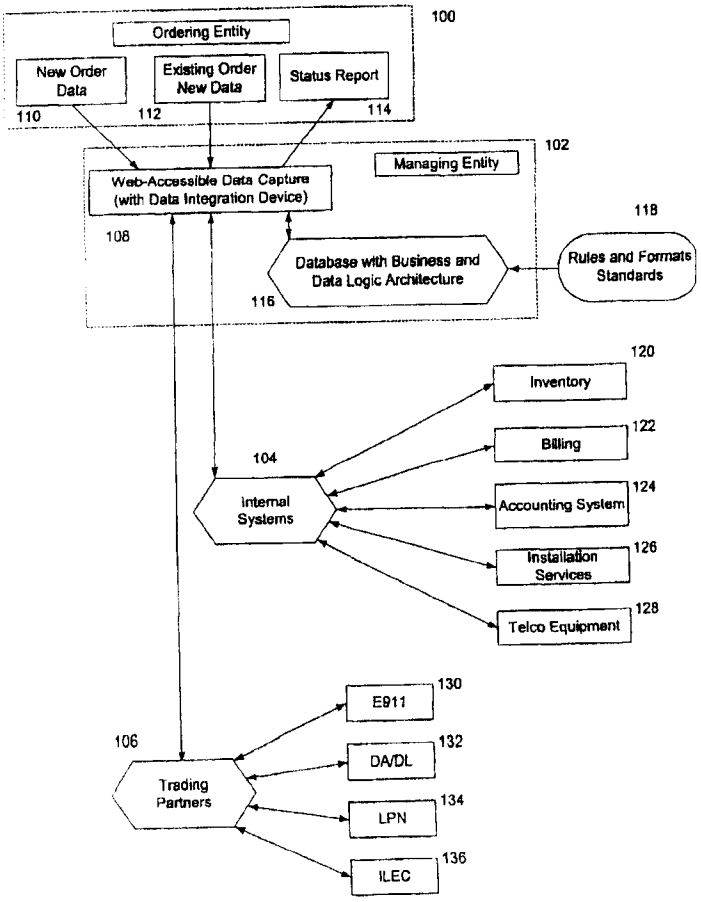
(54) Title: TELECOMMUNICATIONS ORDER ENTRY, TRACKING AND MANAGEMENT SYSTEM



(57) Abstract: A system and method for providing flexible, customer-centric entry, tracking and management of service and product orders is disclosed. The system implements multi-tier client/server architecture that includes one or more clients connected over a network to a server. The client may be any personal computer, telecom network, or other electronic device capable of connecting to the server through the network. The server includes an associated computerized database containing telecommunications product and service specifications and scheduling information. An ordering entity such as a telecommunications customer uses the client to enter customer order information into the server. The server captures the customer order data and facilitates direct interactive communication of this data to vendors, suppliers and subcontractors involved in filling the customer order. The server captures the status for all orders and allows client to tract orders through the entire provisioning process. The server also provides clients with searching and filtering capabilities to allow data to be reformulated to meet the particular needs of the client. The server manages the order process by providing a hierarchical list of tasks required to enter, provision and track customer orders, and provides increased system efficiencies through automation of certain tasks.

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TELECOMMUNICATIONS ORDER ENTRY, TRACKING AND MANAGEMENT SYSTEM

Field of the Invention

This invention relates generally to a distributed computer system architecture and network-accessible data management system and, more specifically, to a system and method for providing flexible, customer-centric entry, tracking and management of telecommunications product and service orders.

Background of the Invention

A customer desiring telecommunications products and services typically contacts a telecommunications company to order the necessary telecom equipment and initiate the requisite service. To facilitate the order, the customer provides the telecommunications company with provisioning data, such as customer information regarding the customer's equipment and service preferences and billing information. From this information, the telecommunications company initiates a series of product orders and service or task requests that must be accomplished prior to successful completion of the customer's order. Product and service orders may include, for example, requests for telephones, routers, PBX and CPE equipment; voice services such as Centrex and analog lines; and data services such as Digital Subscriber Line (DSL), Frame Relay or ATM circuits. Order Entry, Order Management, and Order Tracking tasks may include selecting product and service choices, which may entail working in association with various "trading partners" to accomplish some or all of the following tasks: entering customer information for transfer to the billing and rating systems; performing credit verification; registering the customer with the Emergency 911 (E911) database; registering the customer with the Directory

Assistance/Directly Listing (DA/DL) database records; registering the customer with Local Number Portablility (LNP) database; notifying installation technicians of the necessity for physical installation of telecommunications lines and products; and sending information to the Incumbent Local Exchange Company (ILEC) for provisioning certain elements of the order. The timing of such product orders and service requests is interdependent upon each other. For example, billing and credit information is typically verified before any other work proceeds; E911 number and other emergency contact procedures must be in place at the time of line activation; line installation must occur before certain service activation can be initiated and properly tested, and so forth.

Further complicating the order is the requirement that data collected be in conformity with certain industry standards in order to be provisioned. For example, the ILEC will only accept orders that are in compliance with the Local Service Order Guide (LSOG) or the Access Service Order Guide (ASOG) as promulgated by the Alliance for Telecommunications Industry Solution (ATIS), its Telecommunications Service Ordering Request (TOR) Committee, and the Ordering and Billing Forum (OBF). LSOG and ASOG requirements include numerous standardized rules for ordering and provisioning local telephone service. Attempts at manually preparing orders that will comply with the rules established by LSOG and ASOG result in high order rejection rates by the ILEC.

Product orders and service requests, while initiated by the telecommunications company, are often filled internally by the company's multiple internal systems or by the company's multiple trading partners. Frequently more than one party may be involved in filling any given product order or completing a service request. This creates a significant organizational challenge. The telecommunications company or trading partner overseeing the customer order must remain informed about the status of product orders and service tasks and share that data with each trading partner; not only must the work be done along a specified timeline, but work status must be timely communicated to the telecommunications company and its trading partners who are responsible for products or services dependent on other work. Further complicating the process is that each trading partner may need customer or project status information in a specific format, not necessarily compatible with the format of the information contained in the telecommunications company's other computerized systems or other trading partner's computerized systems.

As a result of the scheduling and logistical difficulties presented by a single customer order, entire industries have been created to oversee various aspects of product orders and service tasks; third-party vendors (gateway providers or systems integrators) exist whose sole purpose is to reformulate customer data for transmission to and inclusion in other trading partner systems. Customer order status is commonly tracked through manual systems or not tracked at all. No single data collection system or computer database currently collects or contains all of the data necessary to provision any single order. As a result, multiple systems, both manual and computerized, must be referenced in order to enter and track customer orders. Further, since no single database contains the necessary information that must be distributed to multiple systems to provision a customer order, it is difficult, if not impossible, to know the status of any given order in all of the various systems at a given point in time. Therefore, customer service suffers because telecommunications company representatives fielding calls regarding the status of a customer's order cannot view all of the necessary information in one place. Similarly, the telecommunications company and trading partners are unable to quickly determine whether the order is ready for the next phase of the provisioning process because there is no single source for the necessary information.

A simple example of existing systems is illustrative, and FIGURE 1 shows a graphical depiction of the typical flow of product and service order information to various internal systems and trading partners. A telecommunications customer, a customer representative, or other telecommunications product or service broker (ordering entity) 10 submits information for a product and/or service order (provisioning information) to a telecommunications company 12. This provisioning information is manually entered into the telecommunications company's internal systems 14. Based on this provisioning information, the telecommunications company initiates a series of product orders and service requests to its internal systems 14 and its trading partners 16. The telecommunications company's internal systems 14 may include inventory 18, billing 20, and accounting systems 22, and may invoke the provision of installation services 24 and/or telco equipment 26. Trading partners 16 may include entities providing some or all of the internal systems listed above or additional services, such as Emergency 911 28, Directory Assistance/Directly Listing (DA/DL) 30, Local Number Portablility (LNP) 32, and Incumbent Local Exchange Company (ILEC) 34 equipment and services.

The telecommunications company 12 circulates the provisioning information to the appropriate internal system 14 or trading partner 16. Currently, this information is transmitted via fax, mail, email, or through multiple specialized computer interfaces specifically designed either by the telecommunications company, a third party software vendor, or by the trading partner themselves to transmit a particular type of data to a particular trading partner. Trading partners who receive information via facsimile, mail, or email must reenter data in their own computer systems. Trading partners must then acknowledge receipt of the data, return error reports if the data is incomplete or inaccurate, and then update the telecommunications company on the status of the order. This information is typically sent via multiple communications methods, including by facsimile, mail, or email. Often, as a result of errors in the original order, the telecommunications company must reinitiate the process.

The current systems are therefore manual, redundant and task-centric. These systems focus on manually communicating information along single and independent routes without automated or centralized management of the tasks. As a result, much of the same data is often distributed to the telecommunications company's multiple internal systems as well as to its external trading partners, albeit frequently reformulated as required by the separate provisioning entities. Further complicating the process is the lack of a central order management/tracking database for information being returned from the various internal systems and trading partners. This information could indicate errors in the provisioning data delivered (bad address, missing information), problems with the order (service not available in the customer's area), and delays caused by provisioning inefficiency (lack of inventory and lack of resources causing delays). The lack of a central order entry/order tracking and order management system therefore creates significant difficulties in managing the overall status and progress of the work order and in communicating information among the provisioning entities in a timely fashion to facilitate efficient procurement of products and completion of tasks.

The technological growth in the last decade in computer networking, remote system communication, and process automation has facilitated computerized entry and management of many of the steps necessary to provision products and services. Telecommunications companies, third-party vendors, and the telecommunications company's trading partners have independently designed software to record, update and manage the parts of the provisioning process assigned to them. Due to the

number and diversity of trading partners involved in the process, different data formats and scheduling complexities, and limitations in computer system architecture, interface, and network communications, there has not been efficient coordination among telecommunications companies (including their internal systems), downstream third-party vendors, and trading partners in creating a single, automated solution to the complexities of provisioning customer orders.

Further, existing computer systems predominantly rely on the use of client/server architecture for the management of provisioning information. Client/server architecture requires that the telecommunications company install dedicated client software on their computer systems whose sole purpose is accessing the "server" software. A change in the data required by various internal systems or trading partners may require significant reprogramming of client/server software. Further, the architecture of the client/server software can require that the client component be upgraded due to a change on the server, or that the server software be modified to accommodate a change on the client. For example, the inclusion of new products that require additional customer data may require that the client/server software undergo significant reprogramming to capture the additional data required by new products or changes in technology (i.e., the software may need to capture additional or different data to provision DSL services when compared to the information necessary to provision an older technology such as Integrated Services Digital Network (ISDN) services.) Once the client/server software is rewritten to capture additional data, the software must be redistributed and installed on each "client" computer. The process of reinstalling client/server software can be expensive and unwieldy. In contrast, a central data management system that can easily be modified to capture additional or different customer data necessary to provision new goods and services can then distribute the newly captured data to all of the dependant downstream systems, both with internal and external trading partners.

The present invention is directed to a system and method that uses distributed computer system architecture and a network-accessible data management systems via the Internet to provide flexible, customer-centric entry, tracking and management of telecommunications product and service orders that overcomes the above-mentioned problems. The present invention greatly reduces inefficiencies inherent in traditional telecommunications product and service order procedures, facilitates increased communication between parties involved in customer orders, and reduces the need

for independent oversight and management of third-party participation in the order process.

Summary of the Invention

In accordance with this invention, a telecommunications company and its trading partners access a primary data bases via the Internet with the use of a commonly available Graphical User Interface (GUI), often referred to as a browser. Through the GUI interface, provisioning information, including customer, product, and service selection data, is entered on "Web pages." This provisioning information is stored in the database. Both the Web pages accessed by the telecommunications customer and the underlying database are designed to collect, store and transmit the data in conformity with the standards established in LSOG, ASOG, and other industry standards, such as the Master Street Address Guide (MSAG). Once the data is stored, certain customer and service selection data is formatted as specified by the trading partner's systems and sent to the trading partner via electronic transmission over the Internet, or via any other method as may be dictated by the trading partner's internal system requirements. The methodology and format of the data transmission (e.g., email, ftp, Internet, dial-up) is dependent upon the requirements of the trading partners. The stored data may be entered automatically into the trading partner's computerized systems for later use, or it may immediately prompt the trading partner to perform some act, such as dispatch an installation vehicle.

In addition to the creation of databases and the transmission of data to trading partners, when a service order is entered into the database, a task list, or process flow list, is generated indicating the steps that must be taken to complete the service request. The generated tasks are assigned to personnel who either work at the telecommunications company or at one of its trading partners. The telecommunications company and the trading partners view, update, modify, and report the status of their work on the task list via the Internet through the browser.

Brief Description of the Drawings

The many features and advantages of this invention are better understood with reference to the following detailed description of the preferred embodiment, along with the following drawings.

FIGURE 1 is a graphical depiction of a prior art telecommunications product and service ordering system showing the typical flow of product and service order information to various trading partners.

FIGURE 2 is a graphical depiction of an Internet-based, multi-tier client/server architecture system formed in accordance with the present invention for providing a distributed, network-accessible data management system.

FIGURE 3 is a graphical depiction of a distributed, network-accessible data management system formed in accordance with the present invention providing entry, tracking and management of product and service orders.

FIGURE 4 is a flowchart of the operational logic of the distributed, network-accessible data management system formed in accordance with the present invention.

FIGURE 5 is a flowchart of the operational logic of the Order-Entry aspect of the present invention shown in FIGURE 4.

FIGURE 6 is a graphical depiction showing the flow of product and service order information and its status to various internal systems and trading partners in accordance with the present invention.

Detailed Description of the Preferred Embodiment

The present invention is directed to improving efficiencies in telecommunications product or service order processing by providing centralized entry, tracking and management of product and service orders. To accomplish this objective, the present invention describes the following: (1) an Internet-based, architecture; and (2) a system and method for entering, tracking and managing telecommunications product and service order information, which includes a system for distributing and coordinating information between and among internal systems and trading partners and a system for analyzing and reporting the status of orders and various related processes. Each of these aspects of the present invention will be discussed in turn below.

Internet-Based Architecture

The present invention provides Internet-based architecture that allows flexible and scalable implementation of a distributed system enabling customer-centric entry, tracking and management of telecommunication product and service orders. By way of introduction, Internet-based architecture enables a computerized process, commonly managed on a single client-server, to be divided using multi-tier (or n-tier) architecture having a communication mechanism that allows the n-tier components to operate in synchronization. The computerized process is commonly incorporated into client/server architecture and, by definition, requires a specialized "client"

software application. A standardized client common to all computers in Internet-based architecture, for example, is a browser.

A standard mechanism for dividing the architecture is to place it into "layers," or operational zones, in accordance with inherent functionality. Necessary layers in software architecture may be delineated as follows:

Presentation Logic This layer handles how the user interacts with the application.

Business Logic This layer enforces the business processes and procedures.

Data Access Logic This layer handles the storage and retrieval of data.

The separation of the layers requires careful design and an accurate definition of the boundaries to ensure that the logic within the respective layers is not intertwined.

By dividing the operations into n-tier layers, the presentation layer (Web page(s)) can be easily changed without reprogramming of the business logic or the data access logic, as can be required by traditional client/server architecture. Therefore, since the various layers are independent, when the data collection and organizational requirements are changed by a standards body, such as the ATIS, the presentation layer need not be rewritten to facilitate a change to the data layer or the business process layer.

The most simple and common implementation of traditional client/server architecture is a two-tier client-centric architecture wherein both the Presentation Logic and the Business Logic are placed onto a PC-based client. The relational database on the server implements the Data Access Logic. The connection between the client and the server is accomplished via a network using well-known database middleware such as Open Database Connectivity (ODBC) or Database-Library (DB-Lib). An alternative to the client-centric architecture is the two-tier server-centric architecture where the Business Logic is placed on the database server with the Data Access Logic. The Presentation Logic is retained on the PC-based client. The connection between the client and the server is accomplished via a network using database middleware.

An improved architecture involves inserting a middle tier between the client and the server. The middle tier provides the basic message switching, contains the business rules of the application, and is responsible for accepting the client requests, applying the business logic and invoking the database, handling responses from the database, applying further business logic, generating responses to return to the client,

and isolating the client from the server and its Business and Data Logic. By creating three tiers, the Presentation Logic, Business Logic and Data Access Logic, the major advantage is that any of the layers can be enhanced or replaced without affecting the other layers. If the three-tier architecture is properly designed, it is possible to enhance the system to support new delivery channels.

The present invention uses a further extension of the three-tier architecture, a multi-tier architecture, which provides flexibility and scalability that cannot be achieved with the three-tier architecture described above. The present invention uses a multi-tier architecture solution wherein the Business Logic can be partitioned and distributed across several servers. Furthermore, additional tiers can be included to support multiple databases and other services such as legacy systems, data warehouses, message switching, and fax machines. Enabling and distributing the workload over many CPUs using symmetric multiprocessing or "clustering" provides for workload distribution across multiple systems in separate geographical areas.

Demand for interactive content on the Internet has transformed Web computing into a new implementation of multi-tier computing that offers solutions to many of the traditional problems of the client/server architecture. The first generation Web browsers were able to display text, images and sound. The Web server initially transmitted static information using HTML. The functionality of the Web server was extended with the implementation of the Common Gateway Interface (CGI). Information could be captured via simple HTML forms and transmitted to the Web server, and the Web server could dynamically create pages using the C and PERL programming languages. Because Web applications are server based, corporate IT/IS departments do not need to deploy the traditional "client" custom application, but can rely on the personal computer and Web browser to implement the Presentation Logic.

FIGURE 2 shows the graphical depiction of the preferred embodiment of an Internet-based, multi-tier architecture system formed in accordance with the present invention. One or more Web browsers 40 are connected via a network 42 to one or more Web servers 44, which in turn are connected to application servers 46, and database servers 48. Client Web browser 40 is a standardized Web browser capable of handling the Presentation Logic that is defined by HTML, Java, and built-in scripting languages and related components. Web server 44 is located in the middle tier and is used to distribute data to the client and integrate the client session with the Business Logic using server-based processing, such as CGI or Java scriplets.

The Business Logic and Data Access Logic can be modularized enabling distribution across multiple systems. Application server 46 features Transaction Process Monitors (TPM), which can be used to aid and modularize complex Business Logic functionality such as coordination of multiple transactions across multiple databases, resource sharing, and system load balancing. Database server 48 handles the storage and retrieval of data. The Data Access Logic layer may exist on multiple database servers, and is used to invoke stored procedures, triggers and constraints when data is extracted, inserted, updated or deleted to validate and ensure that the business processes and procedures are followed.

The architecture of the present invention provides a structured approach where the components are clearly separated into distinct functional groups with common communications protocols. This design provides the benefit of faster implementation and fewer errors due to the interchangeability of the components. Moreover, this architecture isolates the client from the "back end" of server interfaces responsible for database maintenance. Changes can be implemented in the back end, such as a database upgrade or adding new functionality without the need to update the client, because the client is replaced with the CGI. The modular design allows a user to choose functionality to meet its needs and to extend and expand the server system without affecting the client. Finally, the architecture of the present invention facilitates the system and method of entering, tracking and managing telecommunications product and service order information further disclosed below.

Customer-Centric Entry, Tracking and Management of Telecommunications Product and Service Orders

A preferred embodiment of the present invention provides a Web-enabled telecommunications Order-Entry/Order-Tracking/Order-Management system using the Internet-based, multi-tier architecture described above. The integrated architecture of the present invention allows users to add to or extract data from the order entry system, then analyze and report on it. Data in the order entry system is presented via Web pages for easy access by the telecommunications company, its customers, and its trading partners. This includes the ability to allow telecommunications customers, customer representatives, and other trading partners to access their own order and account information via the Internet. Moreover, because the invention contains all the data to provision service orders, it efficiently interfaces with external systems (e.g., E911, DA/DL, LPN, and ILEC provisioning systems). The invention also maintains information about which orders, sub-sets of

order and order information are related, and coordinates the activities between and among the entities responsible for filling the orders.

FIGURE 3 is a graphical depiction of a distributed, network-accessible data management system formed in accordance with the present invention providing entry, tracking and management of product and service orders. One or more telecommunications customers, customer representatives, or other telecommunications product or service brokers 50 engage the Presentation Logic of the client Web browser 52 to interact with the system and, specifically, to provide order information for telecommunications products or services, including such information as the customer's equipment and service preferences and billing information. HTML, Java, and built-in scripting languages and their components (or their equivalents) define the Presentation Logic. The telecommunications customers, customer representatives, or other telecommunications product or service brokers have the option of entering an order directly into the system via the Internet, or a sales representative may collect all necessary data in a paper sales packet. Regardless of the manner in which the order information is obtained, the data maps directly to a multitude of Web-enabled order entry forms. Further, the forms and data are stored in accordance with ATIS standards for telecommunications service orders and other standards relevant to the type of data obtained. Thus, for example, the paper-based sales packet maps the information to the Web-enabled order entry forms, all of which are created in compliance with the ATIS and other relevant standards. Any data that is not in compliance with the relevant standard(s) is rejected at the order entry stage, which eliminates reprovisioning caused by orders being rejected by the trading partners. This consistent use of provisioning information is critical as it provides the system the necessary information to manage the data to identify data interdependencies.

The Web browser connects over the Internet to Web server 54, which is used to distribute data to the client and integrate the client session with the Business Logic using CGI and the Internet Server Application Programming Interface (ISAPI) or the Netscape Server Application Programming Interface (NSAPI).. In an alternate embodiment, the Business Logic and Data Access Logic can be modularized enabling distribution across multiple systems.

Web server 54 connects through a network framework 56 to one or more database servers 58, application servers 60, and other data interaction devices 62. The database server 58 handles the storage and retrieval of data, as well as maintains

data integrity by invoking stored procedures, triggers, and constraints when data is extracted, inserted, updated or deleted to validate and ensure that the business processes and procedures are followed. Application server 60 implements business and system functions such as the coordination of multiple transactions across multiple databases, resource sharing, and system load balancing. Data integration device 62 provides for the integration of and interconnection between the managing system and external systems and trading partners 64 to facilitate distribution of product and service order data and status information.

The system and method of the present invention can better be understood by reference to the flowcharts shown in FIGURES 4 and 5. FIGURE 4 shows the three main components and their principal functionality in accomplishing the objectives of the present invention. With reference to FIGURE 4, the described system provides for Order-Entry 70, Order-Tracking 72, and Order-Management 74.

Upon entry of a product and/or service order by a telecommunications customer, customer representative, or telecommunications broker, the system captures all of the data required to provision an order. An order may consist of any number of order items. In the preferred embodiment there currently exists defined order item types, with up to seven variations of each order item type, depending upon the order item activity to be performed (for example "Add," "Change"). It will be appreciated by those skilled in the art that the number and type of defined items, and variations thereof, is dynamic in nature, and subject to frequent change as telecommunications products and services change with technological advancement. The present invention anticipates and is equally applicable to variations in the types of order items defined.

The Order-Tracking aspect of the present invention captures status for all orders and allows the telecommunications company, customers, and trading partners to track orders through the entire provisioning process via the Internet. The system also provides searching and filtering capabilities to allow subsets of orders to be viewed by the telecommunications company, its customers, and various trading partners. For example, the telecommunications company could view a list of only those orders that are in jeopardy. The system also captures dates, times and user identification when provisioning and data-entry steps occur, and provides reports for tracking all aspects of the pending orders.

The Order-Management aspect of the present invention provides a hierarchical list of all tasks required to enter, provision and track customer orders.

Orders consist of collections of order items, and each order item has a set of tasks associated with it. Each task provides information such as start date, due date, completion date, last modified date and current task status, and so forth. It will be appreciated that the present invention is equally applicable to situations involving different tasks and information. Order items may be provisioned and tracked independently of other order items in the same order. For example, an order item for Internet Service Provider (ISP) service could be provisioned independent of an order item for Digital Subscriber Line (DSL) service.

The system further provides for automation of the interfaces to external systems, including trading partners. This automation speeds up provisioning and reduces errors and rejections, which in turn allows for larger volumes of orders to be processed more efficiently. For example, if the anticipated installation date changes, the E911 cutover date is likewise adjusted even though E911 service is not an item ordered by the customer, but rather is a consequence of the item ordered. The present invention is extensible to support multiple types of orders (local, long distance, Internet) and external system interfaces (E911, LNP, DA/DL, and new interfaces as the need arises).

FIGURE 5 is a flowchart of the operational logic of the Order-Entry aspect of the present invention shown in FIGURE 4. A preferred embodiment of the methodology used in the present invention is explained below.

At block 80, a telecommunications customer, customer representative, or telecommunications broker logs in to the client system after typing a URL for accessing the Web server via the client Web browser. At block 82 the client indicates the specific type of order to be placed, namely, whether an order for resale or for use in a particular facility. At block 84, the client selects an existing customer name from a database of records, or creates a new name. Once the client has successfully selected or created a customer name, the methodology proceeds to block 86, where data entry to the server database occurs; the client specifies the product or work requested (the task to be performed by the trading partner). At block 88, the client is required to provide requisite order data, or information prompted for by the system based on the task assigned that is necessary to fill the order. The types of tasks vary tremendously depending upon the industry; the following Table 1 lists properties at present common to all tasks:

	Property	Description
1	Task Description	The Name/Description of a task.
2	Task Status	The current status of a task. In most cases, this value will be updated by the user, however, there are cases when the system will automatically update Task Status. Indicates whether the task is Incomplete, Complete, or in Jeopardy.
3	Provisioning Status	Status assigned to each order item, indicating how far the order item is from completion. This status acts as a flag to signal which of the various trading partners should currently be working on the order item. When the user submits an order item (by clicking a button on the screen), indicating that all the current job steps have been completed, the Provisioning Status automatically changes. As an order item changes provisioning status, the job steps relevant for the next trading partner to work on the order item are automatically added to the task list.
4	Start Date	The Date on which a task is scheduled to begin. This value may be defaulted by the system, or may be set by the user.
5	Completion Date	Date on which the task status is set to "Complete." This date is system generated.
6	Due Date	Date by which the task should be completed. This value may be defaulted by the system, or may be set by the user. The system will place a task in jeopardy if the Due Date is reached and the task status is not "Complete" – i.e. it won't wait until after the Due Date has passed to place a task in jeopardy. The system will be user configurable to set jeopardy thresholds for each task.
7	Last Modified Date	Date and Time stamp of the last modification to the task. This date will be system generated.
8	Last Modified By	User ID of the last person to modify the task. "SYSTEM" will be used when the system and not a person has modified the task. This value will also be system generated.
9	Note(s)	Any number of notes may be attached to each task. Each note is a free-form text field up to 255 characters long.

In addition to these common properties, in the preferred embodiment each specific task contains additional properties that are unique to that particular type of task, which properties and related data fields are available for viewing and update. For example, "Form Tasks" will always contain a button or a link to a separate page, (or Form), that is used for capturing or viewing a specific set of data.

Table 2 shows seven task types currently used in the preferred embodiment:

	Task Type	Description
1	Order Task	Container task for the entire order. There will always be one and only one Order Task per order.
2	OrderItem Task	Used to add a task or group of related tasks to an order. By adding an OrderItem Task to an order, the user is adding a predefined set of "job-steps" that will need to be completed in order to complete provisioning of the order. The user has the ability to add additional job steps to the predefined set, if needed.
3	Order Entry Form Task	Contains a button or a link to a form/page for data entry. Each Form Task will access a page for capturing and/or viewing any number of data fields. Each data entry page will provide the following [Save] and [Cancel] functionality. Both the [Save] and [Cancel] buttons will return the user from the Form Task data entry page to the primary order page. The [Save] button will also save any edits to the database. If an order item has already been submitted and therefore has a status of "In-Process," the data entry page will become read only and no [Save] button will appear.
4	Response Form Task	Provides the same capabilities as an Order Entry Form Task, except the data being captured is provisioning information.
5	Action Task	Contains a button to cause the system to perform some action. Action Tasks can be things like: Send a fax, Generate a batch file, Send an e-mail, etc.

	Task Type	Description
6	Status Task	Used to track the who, what and when of a particular job-step in the provisioning process. It is used to track how far an order item is from completion. In other words, there is no action to be performed by the system for a Status Task, and no order entry or provisioning data to be captured. The Status Task simply provides a means for tracking steps in the provisioning process to report whether the step is in process, in jeopardy, or completed. Examples of Status Tasks include: FOC Received, CLR Sent, etc.
7	User Task	Allows the user to create their own Status Tasks at any point in the process, and add them to a specific order item; all other task types are created by the system in response to order items that have been added to an order. Any number of User Tasks may be defined and inserted into the task list for any given order.

The system provides a complete listing of all events necessary to provision an order, and self-populates with the appropriate tasks for each order type. Therefore, tasks that are essential to higher-level tasks are so designated. Only upon completion of the lower level task can the higher-level task be identified as "complete."

Upon entering the requested information, the client proceeds to block 90, where the order is submitted to the system server(s) for subsequent Order-Tracking, Order-Management, and distribution of date to internal systems and trading partners for the provisioning of goods and services. At block 92, the order information is evaluated. If all necessary provisioning information is entered correctly, the client proceeds to block 94 and logs out of the system by terminating or otherwise disconnecting from the Web-page interface. If the order information is entered incorrectly, the system alerts the user to correct the information by returning the operational flow back to block 88. At block 96, the client may log back into the system to monitor the progress and/or verify the status of a particular order, as well as supplement or otherwise modify the order.

FIGURE 6 is a graphical depiction showing the flow of product and service order information and its status to various internal systems and trading partners in accordance with the present invention. Specifically, FIGURE 6 shows the results of implementing the above-described system for telecommunications order processing.

In the present invention, the ordering entity 100 communicates provisioning information regarding a product and/or service order to a managing entity 102 in a form that maps directly to the Order-Entry system interface. The managing entity could be a telecommunications company, an application service provider (ASP), or some other third-party entity responsible for managing the data capture, dissemination, and tracking of the provisioning information. The provisioning information is subsequently forwarded to the managing entity's database for formatting, storage, and subsequent dissemination to the appropriate telecommunications company internal systems 104 and trading partners 106.

More specifically, an ordering entity 100 communicates with managing entity 102 via a Web-accessible data capture system 108 using Internet-based presentation logic accessible over a network. The ordering entity's communication may include submitting order data for a new order 110, submitting new order data for an existing order 112, for example to update or correct existing data or place a request for supplemental products or services, and/or retrieving status information on the order 114. The Web-accessible data capture system is used as an interface to communicate the provisioning and order status information between the managing entity's database system 116 and the ordering entity. A component of Web-accessible data capture system 108 also acts as a data integration device to provide for the integration of and interconnection between managing entity 102 and internal systems 104 and trading partners 106 to facilitate distribution of product and service order data and status information. As explained below, the Web-accessible data capture system is commonly and simultaneously accessible by not only the ordering entity and the managing entity, but also by the internal systems and trading partners. The database system contains business and data logic architecture that formats the incoming provisioning information according to the rules and formats required by industry standards 118 such as the Local Service Order Guide (LSOG) or the Access Service Order Guide (ASOG). The database system evaluates and maintains the provisioning information and returns to each entity, via Web-accessible data capture system 108, status information and rejection notices when necessary. The user interface of the Web-accessible data capture system can be customized to present the information required by the user, including only that data relevant to the particular entities' function and responsibility in the provisioning process.

Managing entity 102 automatically initiates a series of product orders and service requests directly to internal systems and trading partners, bypassing the need

for manual distribution of paper-based order information and repetitive data entry into multiple systems. As described above, the telecommunications company's internal systems 104 may include inventory 120, billing 122, and accounting systems 124, and may invoke the provision of installation services 126 and/or telco equipment 128. Trading partners may include entities providing Emergency 911 130, Directory Assistance/Directly Listing (DA/DL) 132, Local Number Portablility (LNP) 134, and Incumbent Local Exchange Company (ILEC) 136 equipment and services. Product order and service requests are automatically formatted to meet the unique requirements of the particular internal systems or trading partners.

Internal systems 104 and trading partners 106 subsequently report the status and work completion to managing entity 102 via the Web-accessible data capture system 108. Because status information from participating entities is directly updated, maintained, and commonly accessible, ordering entity 100, managing entity 102, internal systems 104, and trading partners 106 can all access and are immediately informed of reported changes to the status of as well as modifications to the work orders. This facilitates timely completion of product and service orders, especially those that are dependent on the status and completion of other orders.

While the preferred embodiment of the invention has been illustrated and described, many changes can be made without departing from the spirit and scope of the invention. Accordingly, the scope of the invention is not limited by the disclosure of the preferred embodiment. Instead, the invention should be determined entirely by reference to the claims that follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A multi-tier client/server system for distributed, network-accessible data management, comprising:

(a) a server associated with a database containing telecommunications information;

(b) a remote client coupled to the server via a network; and

(c) a memory coupled to the server, the memory containing stored program instructions executable by the server, comprising:

(i) receiving customer order information from a remote client;

(ii) evaluating the customer order information to generate an order of at least one product or service;

(iii) communicating the product or service order to a provisioning entity;

(iv) updating the server with information on the status of the product or service order; and

(v) providing access to the status of the product or service order from the remote client.

2. A method for distributed, network-accessible data management in a multi-tier client/server system, comprising:

(a) entering customer order information from a remote client to a server over a network, the server being associated with a database comprising telecommunications order information and product and service specifications and scheduling information;

(b) evaluating the customer order information at the server to generate an order of at least one product or service;

(c) communicating the product or service order to at least one internal system or trading partner;

(d) updating the server with information on the status of the product or service order; and

(e) providing access to the status of the product or service order from the remote client.

3. The method of Claim 2, wherein providing access to the status of the product or service order from the remote client comprises providing remote clients

with searching and filtering capabilities allowing selective modification of the manner in which information related to the product or service order in viewed.

4. The method of Claim 2, wherein communicating the product or service order to at least one internal system or trading partner comprises providing a hierarchical list of tasks required to enter, provision and track customer orders.

5. An Internet-based, multi-tier architecture system for processing telecommunications information, comprising:

(a) at least one database server for the storage and retrieval of data, the database server having associated memory containing stored program instructions executable by the database server to invoke stored procedures, triggers and constraints when data is extracted, inserted, updated or deleted from the database server;

(b) at least one application server, coupled to the database server via a network, the application server having associated memory containing stored program instructions executable by the application server to coordinate data transactions associated with the database server;

(c) at least one Web browser to facilitate input of user data; and

(d) a Web server coupled with the Web browser, the at least one database server, and the at least one application server via a network, the Web server used to distribute data between the Web browser and the application and database servers.

6. A method for provisioning telecommunications orders submitted by an ordering entity in an Internet-based, multi-tier architecture system, comprising:

(a) capturing telecommunications order information required to provision a telecommunications order, the data including customer information, product and service specifications, and work-scheduling information entered by the ordering entity;

(b) generating a list of tasks necessary to provision the telecommunications order;

(c) provisioning the telecommunications order by communicating the tasks necessary to provision the telecommunications order to at least one provisioning entity; and

(d) capturing the status of the telecommunications order to allow the provisioning entity to track orders throughout the provisioning process via Internet-based presentation.

7. The method of Claim 6, wherein processing the telecommunications order comprises managing the tasks necessary to provision the telecommunications order.

8. The method of Claim 6, wherein processing the telecommunications order comprises modifying the tasks necessary to provision the telecommunications order.

9. The method of Claim 6, wherein processing the telecommunications order comprises terminating the tasks necessary to provision the telecommunications order.

10. The method of Claim 6, wherein capturing the status of the telecommunications order comprises reformulating the telecommunications order information accessible to the provisioning entity.

11. A method for processing telecommunications orders submitted by an ordering entity in an Internet-based, multi-tier architecture system, comprising:

(a) authorizing access to the system by the ordering entity;

(b) obtaining telecommunications order information for at least one product or service from the ordering entity;

(c) determining the type of product or service requested by the ordering entity based on the telecommunications order information;

(d) provisioning the product or service by submitting the appropriate telecommunications order information to a provisioning entity; and

(e) terminating the ordering entity's access to the system.

12. The method of Claim 11, wherein authorizing access to the system by the ordering entity comprises retrieving ordering entity identification information from the system database.

13. The method of Claim 11, wherein provisioning the product or service comprises:

(a) determining whether additional information is needed from the ordering entity to facilitate provisioning the product or service based on the type of order requested by the ordering entity, the identification information already available on the ordering entity in the system, and the specific product or service requested by the ordering entity; and

(b) if additional information is needed, obtaining the additional information from the ordering entity.

14. The method of Claim 11, comprising accessing the telecommunications order information by the ordering entity.

15. The method of Claim 14, wherein accessing the telecommunications order information by the ordering entity comprises at least one of monitoring the telecommunications ordering process, verifying the status of the provisioning of the product or service, supplementing the telecommunications order information, or modifying the telecommunications order information.

16. A method for entry of telecommunications order information by an ordering entity in an Internet-based, multi-tier architecture system, comprising:

(a) accessing the system via an ordering entity login;

(b) specifying a product or service;

(c) if the ordering entity is known to the system, selecting ordering entity identification information from the system database;

(d) identifying the product or service requested;

(e) if additional information is needed to facilitate provisioning the telecommunications order based on the type of product or service requested, the customer identification information already available on the system, and the specific product or service requested, providing supplemental information; and

(f) terminating access to the system.

17. The method of Claim 16, comprising accessing the telecommunications order information by the ordering entity.

18. The method of Claim 17, wherein accessing the telecommunications order information by the ordering entity comprises at least one of monitoring the telecommunications ordering process, verifying the status of the provisioning of the

product or service, supplementing the telecommunications order information, or modifying the telecommunications order information.

19. A multi-tier client/server system for distributed, network-accessible data management and processing of telecommunications provisioning information, comprising:

(a) an ordering entity for communicating telecommunications provisioning information, the telecommunications provisioning information having an order for at least one product or service;

(b) a managing entity for receiving telecommunications provisioning information from the ordering entity and managing the format, storage, dissemination, and tracking of the provisioning information;

(c) a provisioning entity for receiving the telecommunications provisioning information from the managing entity, providing the product or service requested in the telecommunications provisioning information, and reporting the status of the provisioning of the product or service to the managing entity.

20. The system of Claim 19, wherein the managing entity has an associated database system that evaluates and maintains the telecommunications provisioning information and provides status information to the ordering and provisioning entities.

21. The system of Claim 19, wherein the provisioning entity is a system internal to the managing entity capable or providing telco equipment and related installation services and services such as inventory, billing, and accounting.

22. A method for a multi-tier client/server system for distributed, network-accessible data management and processing of telecommunications provisioning information involving an ordering entity, a managing entity, and a provisioning entity, comprising:

(a) communicating a telecommunications order containing provisioning information regarding at least one product or service from the ordering entity to the managing entity;

(b) formatting the provisioning information at the managing entity according to rules and formats required by telecommunications industry standards;

(c) storing the formatted provisioning information at the managing entity;

(d) determining the at least one product or service required to provision the telecommunications order;

(e) initiating an order for the at least one product or service from the managing entity to the provisioning entity in a format to meet the unique requirements of the provisioning entity; and

(f) updating, maintaining, and reporting the status of the telecommunications order as needed to the ordering entity, managing entity, and provisioning entity.

23. The method of Claim 22, wherein the provisioning information is communicated from the ordering entity to the managing entity via a Web-accessible data capture system using Internet-based presentation logic accessible over a network.

24. The method of Claim 23, wherein the Web-accessible data capture system is commonly and simultaneously accessible by the ordering entity, the managing entity, and the provisioning entity.

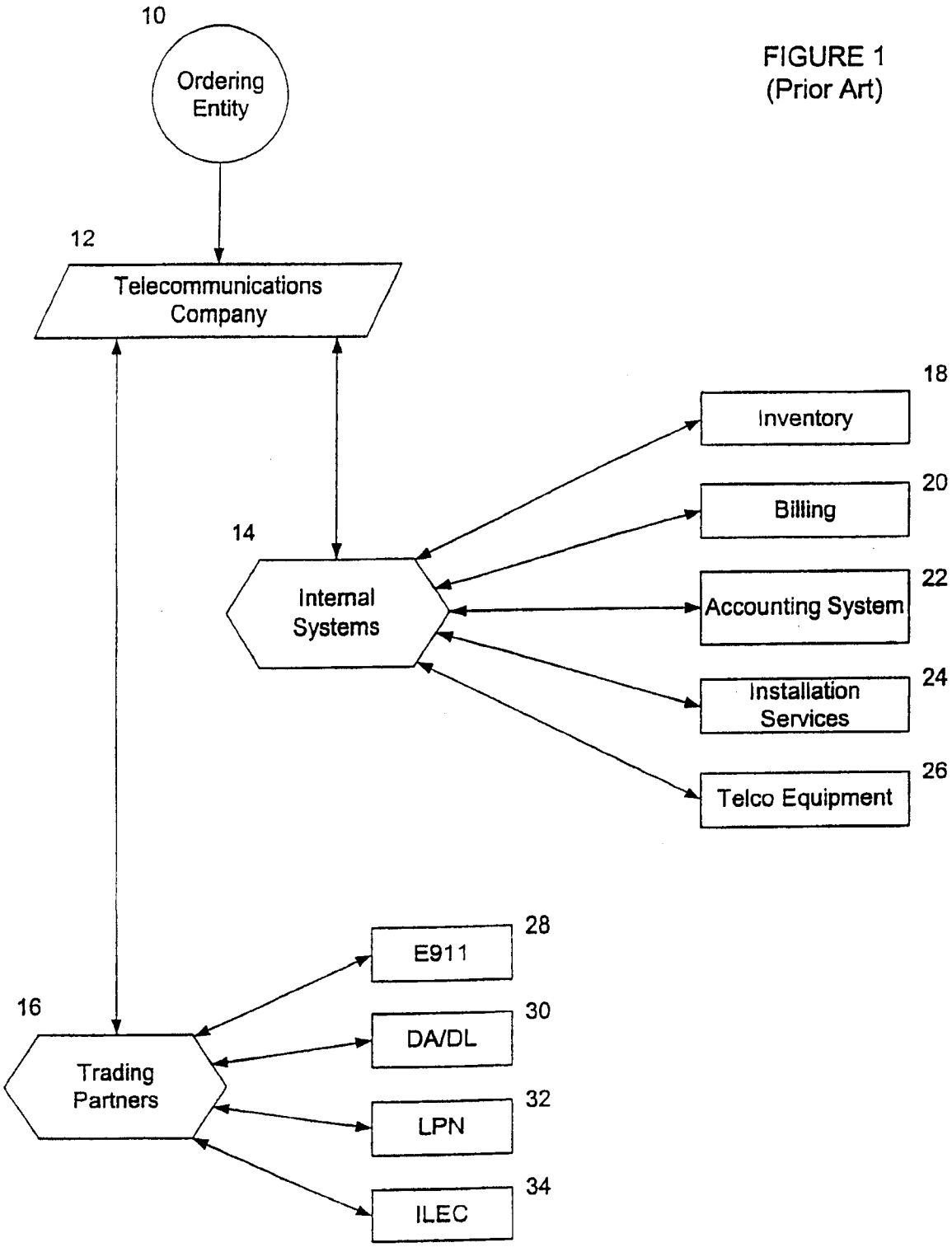
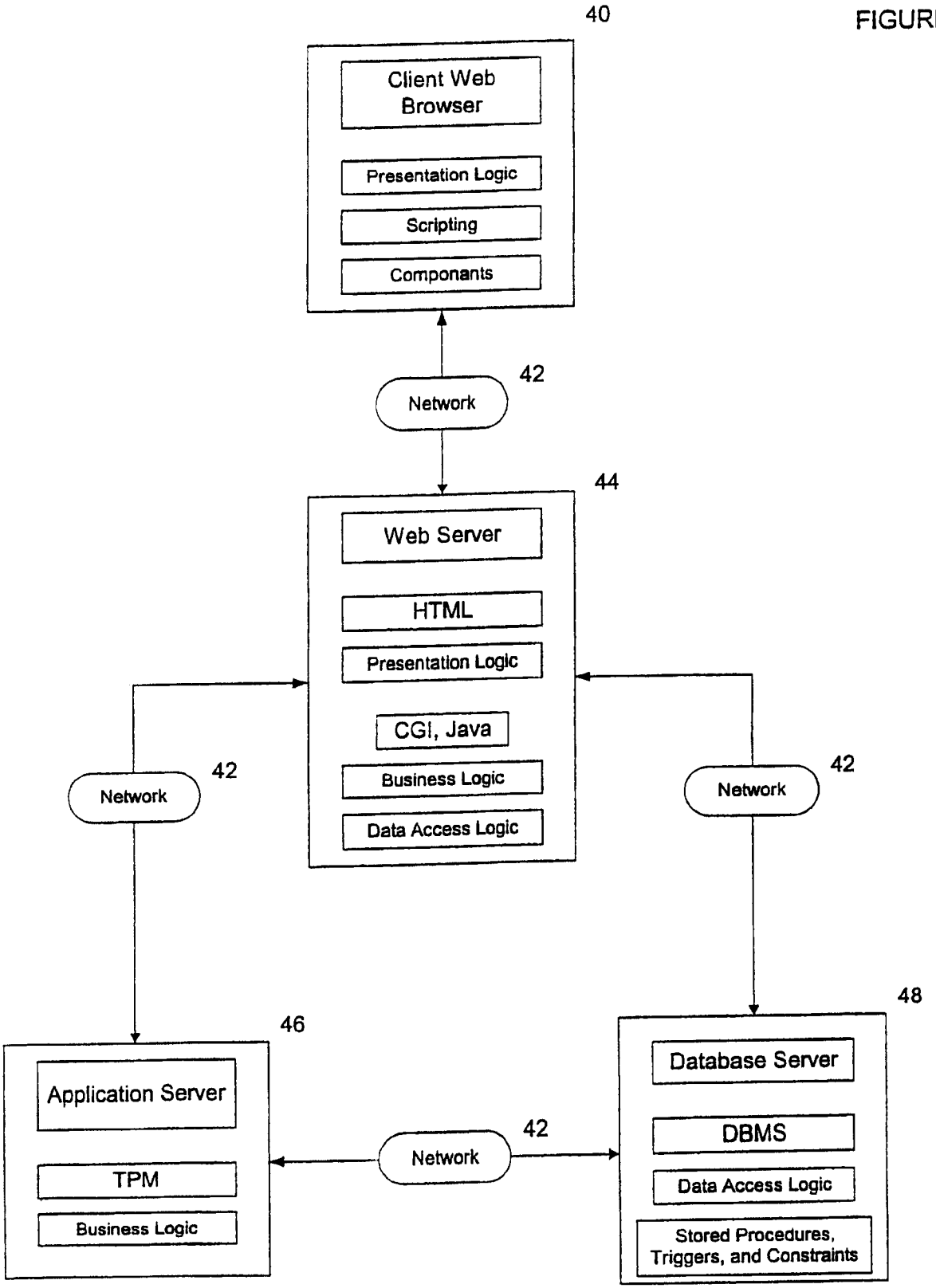


FIGURE 1
(Prior Art)

FIGURE 2


40
Client Web Browser
Presentation Logic
Scripting
Componants
42
Network
44
Web Server
HTML
Presentation Logic
CGI, Java
Business Logic
Data Access Logic
42
Network
42
Network
46
Application Server
TPM
Business Logic
42
Network
48
Database Server
DBMS
Data Access Logic
Stored Procedures, Triggers, and Constraints

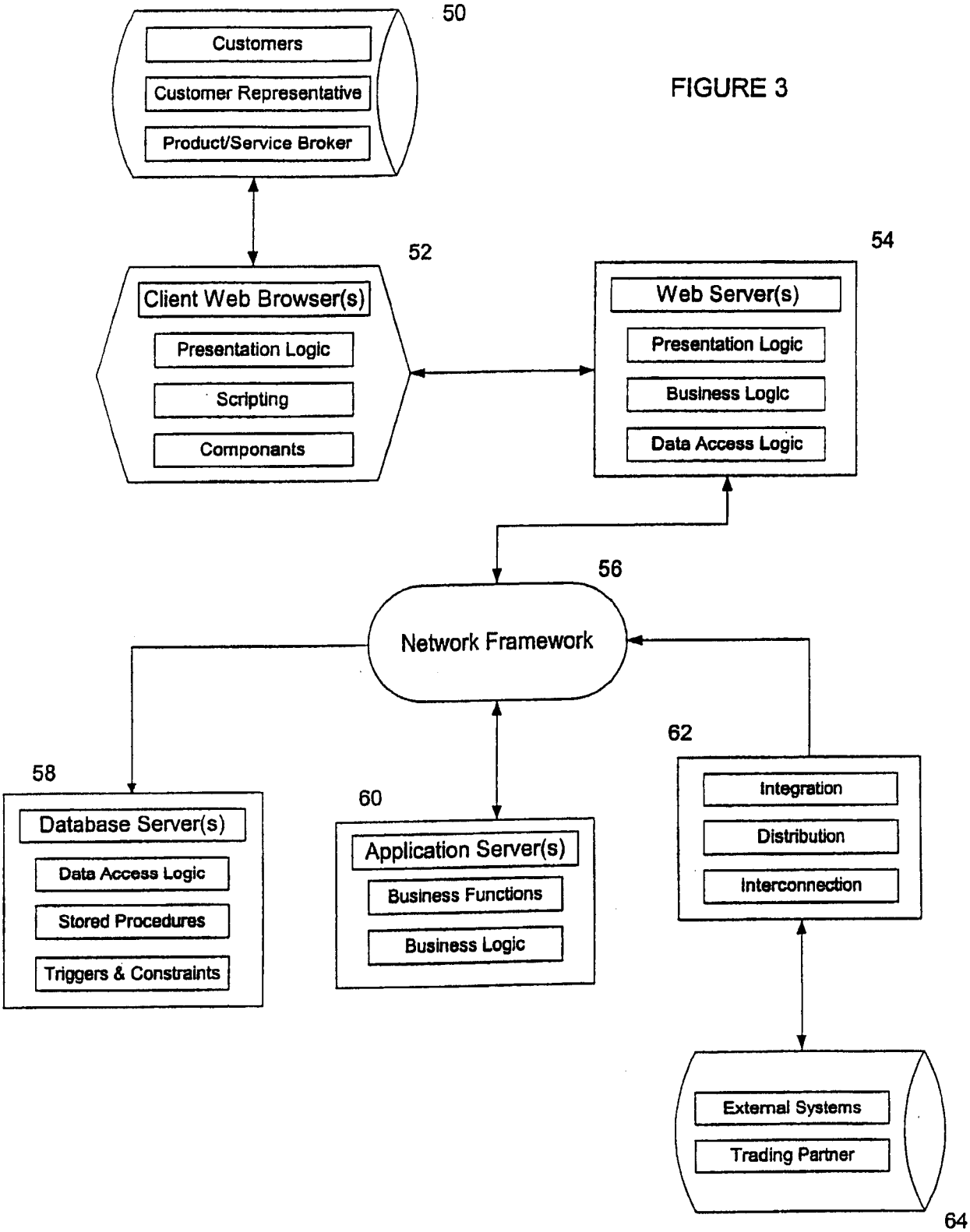

50
Customers
Customer Representative
Product/Service Broker
52
Client Web Browser(s)
Presentation Logic
Scripting
Componants
54
Web Server(s)
Presentation Logic
Business Logic
Data Access Logic
56
Network Framework
58
Database Server(s)
Data Access Logic
Stored Procedures
Triggers & Constraints
60
Application Server(s)
Business Functions
Business Logic
62
Integration
Distribution
Interconnection
External Systems
Trading Partner
64

FIGURE 3

FIGURE 4

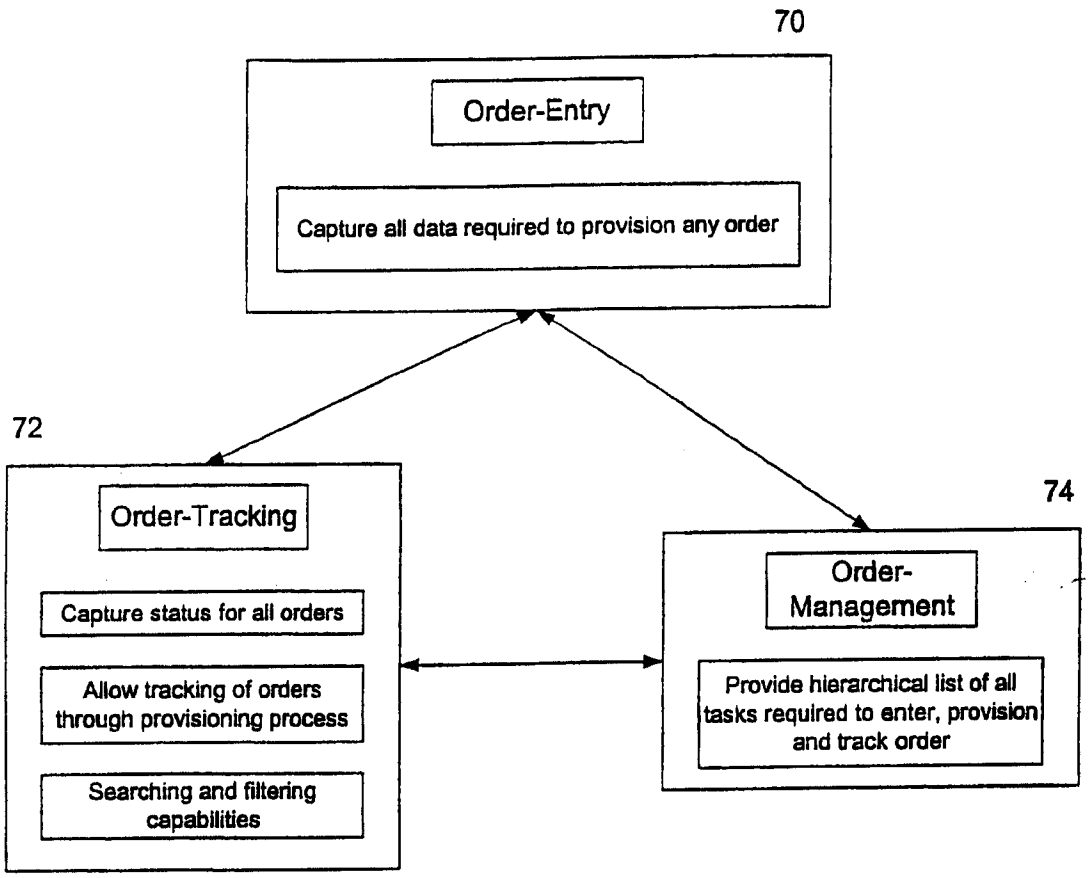
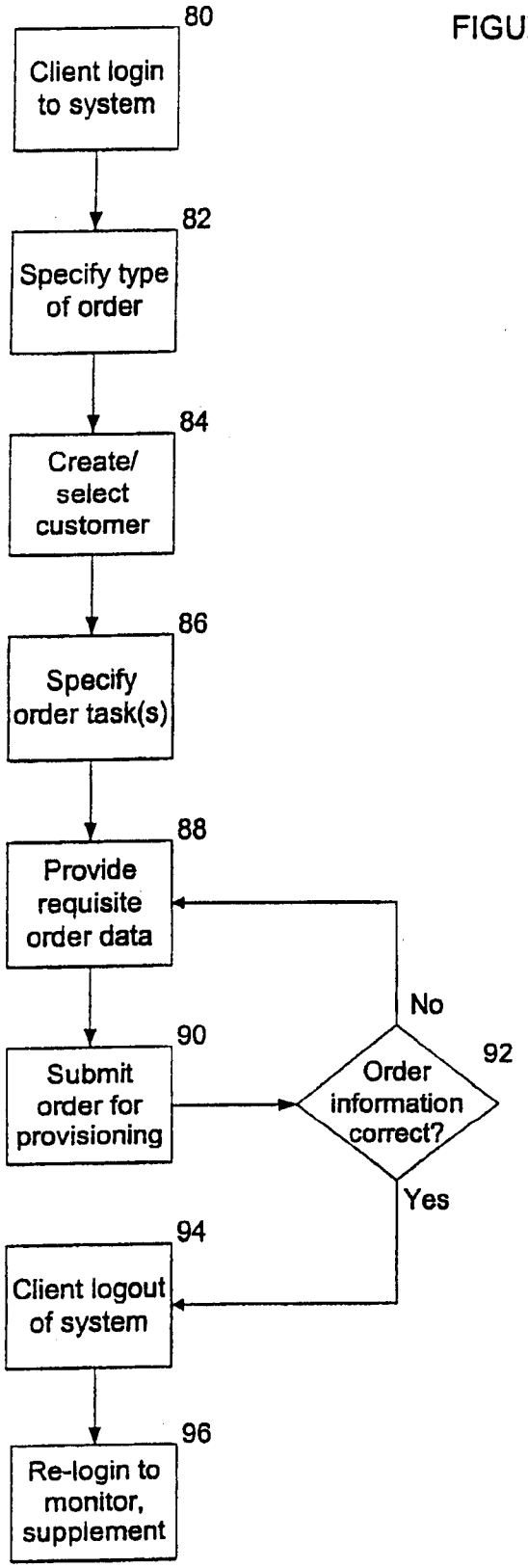

70
Order-Entry
Capture all data required to provision any order
72
Order-Tracking
Capture status for all orders
Allow tracking of orders through provisioning process
Searching and filtering capabilities
74
Order-Management
Provide hierarchical list of all tasks required to enter, provision and track order

FIGURE 5


80
Client login to system
82
Specify type of order
84
Create/ select customer
86
Specify order task(s)
88
Provide requisite order data
90
Submit order for provisioning
92
Order information correct?
No
Yes
94
Client logout of system
96
Re-login to monitor, supplement

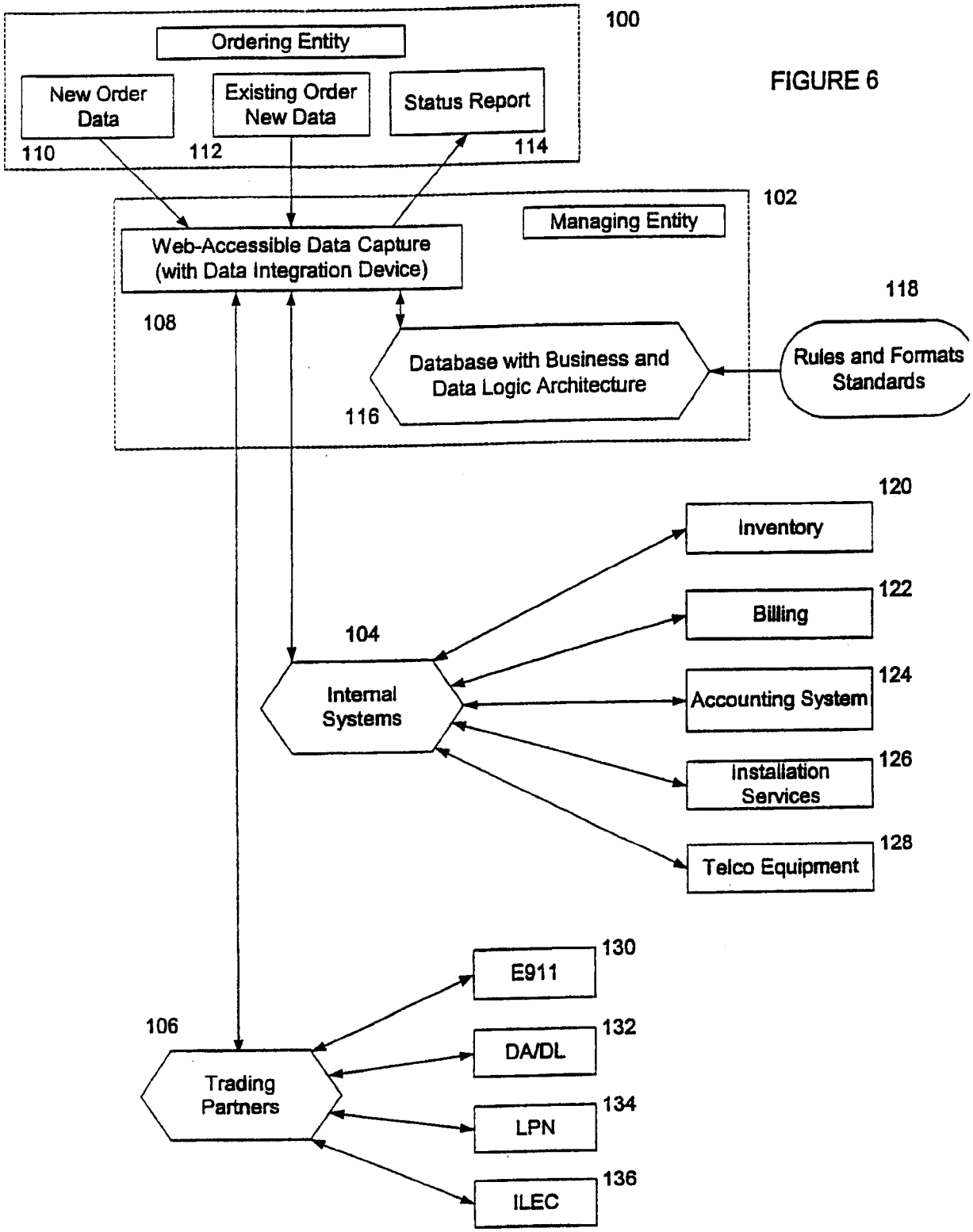

100
Ordering Entity
New Order Data
Existing Order New Data
Status Report
110
112
114
102
Managing Entity
Web-Accessible Data Capture (with Data Integration Device)
108
118
Database with Business and Data Logic Architecture
Rules and Formats Standards
116
120
Inventory
122
Billing
104
Internal Systems
124
Accounting System
126
Installation Services
128
Telco Equipment
130
E911
106
132
DA/DL
Trading Partners
134
LPN
136
ILEC

FIGURE 6